Supervisor´s report

Student: Ing. Ondřej Bílek

Academic year: 2020/2021

Topic: The influence of modified TiO_2 nanotubes on biointerfacial interaction

The doctoral work of Ondřej Bílek deals with the interdisciplinary and interesting topic of the bio-interface between nanostructured surface and mammalian cells and/or bacteria. His work was focused on the surface formed by TiO_2 nanotubes, which are intensively studied in the field of biology for drug delivery, and as a biocompatible material. Nanostructured surface can significantly affect cell adhesion, morphology, metabolism or differentiation. On the other hand, some nanoparticles made of selenium and silver are known for their antibacterial properties. By combining a nanostructured surface and the above-mentioned nanoparticles, he could modulate the properties of such surface for specific applications. Ondřej used for his experimental work the equipment in the shared laboratories of CEITEC BUT and also equipment of the SIX centre at FEEC BUT, both needed for the preparation and modification of TiO_2 samples. The cellular studies were performed at the Department of Biomedical Engineering at FEEC. Ondřej also collaborated with the group of prof. Vojtěch Adam from Mendel University on the performance of bacterial tests.

Ondřej worked on the realization of his dissertation independently. He was initiative and good in solving the problems. He also kept in active contact and regular consultations about the scientific progress with his supervisor. He proved that he was able to self-educate the interdisciplinary area covering electrochemistry, nanomaterials and cell biology. On the other hand, Ondřej´s weakness or more likely not so much patience is related to the writing the articles from my point of view. Moreover, more planned experiments and techniques have not been implemented from his side to improve the quality of the scientific work. Despite this, Ondřej is the first author of two articles indexed in WOS, currently both having 13 citations. He participated as a co-author in an additional publication that is under the review at this moment. He presented his work at PhD retreat and he is the co-author of poster presented at NANOCON conference. The planned scientific stay at the Vienna University of Technology was cancelled due to COVID epidemic.

During the whole period of his doctoral studies, Ondřej very actively participated in the laboratory teaching of the subject "Electronics and Biosensors", in which he created two completely new laboratory tasks and he participated in the innovation of the current tasks. He also helped with the preparation of English version of these laboratory tasks for newly accredited subject of study. Additionally, Ondřej was a holder of interfaculty project supported by the Internal grant agency BUT (so-called IGA), in which he solved tasks related to the application of 2D materials in biosensing.

In conclusion, I give a positive evaluation to his thesis and recommend it to oral defence for obtaining a PhD degree in front of the respective committee.

In Brno, 30.8.2021

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Mgr. Zdenka Fohlerová, Ph.D.

supervisor